



Faculty of Earth Sciences



Department of Mineral Resources & Rocks 3rd & 4th Years Program



The Geological Society
Accredited degree courses

IGNEOUS PETROLOGY

Course Name	Course ID	Prerequisite
<i>IGNEOUS PETROLOGY</i>	<i>EMR 421</i>	<i>EMR 304</i>

Course Description

Formation of magma and its relation with plate tectonic. Evaluation and comparison of the components of igneous rocks. Modal and chemical analysis of minerals. Variation diagrams and their significance. Mineralogical and chemical classification of igneous rocks. Rare earth elements and their significance in petrology. Variation in composition or magma components. Groups of igneous rock, description, occurrence and origin. Detailed chemical differences in chemistry of igneous rocks. Laboratory work: modal and normative analyses of igneous rocks.

Course Objectives

1. Study the different types and sources of magmas in the various tectonic settings.
2. Study some important igneous textures and their significance, as well as preparing petrographic reports for the different igneous rocks.
3. Understanding the different petrogenetic processes, which were involved during the crystallization history of the magmas.
4. Study the geochemical characteristics of magmas and magmatic rocks using major, trace, and rare earth elements. Calculating CIPW. Norm, determining the paleotectonic setting of igneous rocks. Understanding the behavior of major, trace, and rare earth elements during the differentiation of the magma.
5. Using and applying the geochemical modeling to quantitatively evaluating the most common magmatic processes.
6. Study of some phase diagrams to understand the behavior of crystallization of some silicate melt systems.
7. Study of some important rock association (ophiolite, ophiolitic mélange, basalt layered intrusions, granites).

General References for the Course: (Books/Journals...etc.)

Students in this course can read from:

1. *Igneous Petrology*, by Hall, A., 1987. Longman.
2. *Igneous Petrology*, by Hughes, C.J., 1982. Elsevier Scientific Publishing Co., New York.
3. *Introduction to Geochemical Modelling*, by Albarede, F., 1995. Cambridge Univ. Press, New York.
4. *Magma and Magmatic Rocks*, by Middlemost E.A.K., 1985. Longman Harlow.
5. *The Interpretation of Igneous Rocks*, by Cox, K.G., Bell, J.D., & Pankhurst, R.J., 1979. London: George Allen & Unwin.

List of URLs for this Course

- http://www.whitman.edu/geology/winter/JDW_PetClass.htm
- <http://www.geolab.unc.edu/Petunia/IgMetAtlas/mainmenu.html>

Course Outcome

By the end of this course, the student should:

1. Student can be familiar with the different types and sources of magmas in the various tectonic settings.
2. Student can know the most important igneous textures and their significances.
3. Student can understand the different petrogenetic processes that evolved during the crystallization history of the magmas.
4. Student can be acquainted with the geochemical characteristics of magmas and magmatic rocks using major, trace, and rare earth elements.
5. Student can be able to determine the paleotectonic setting of igneous rocks.
6. Student can understand the behavior of major, trace, and rare earth elements during the differentiation of the magma
7. Student can be able to use and apply the geochemical modeling to quantitatively evaluating the most common magmatic processes
8. Student can familiarize with some phase diagrams to understand the behavior of crystallization of some silicate melt systems.
9. Student can be able to categorize important rock association (ophiolite, ophiolitic mélange, basalt layered intrusions, granites, etc.).